Solution/Model Marking Scheme

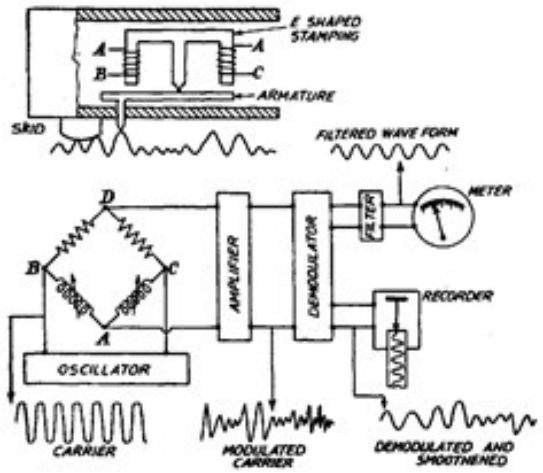
Paper Details:-

Paper Details : T3526 - T.E.(MECHANICAL)(Rev-2012)(CBSGS)(SEM VI) / T0844 - METROLOGY AND QUALITY ENGINEERING.
Date : 21-11-2017
Time :03:00 pm - 06:00 pm
QP Code :25048

N.B.:- Solution or marking Scheme or model answer mentioned in this document is for evaluation guideline only .Any alternative but correct answers should be given full credit

Q1	A]	How will maintain compromise between quality and cost? **General Meaning of Quality and Cost and relation between quality and Cost-1 Mark** **Any two points illustrating maintenance of quality and cost-3 Marks**	5
	B]	Differentiate between primary and tertiary standards? **Primary Standards** For precise definition of the unit, there shall be one, and only one material standard, which is to be preserved under most careful conditions. It is called as primary standard. International yard and International meter are the examples of primary standards. Primary standard is used only at rare intervals (say after 10 to 20 years) solely for comparison with secondary standards. It has no direct application to a measuring problem encountered in engineering. **2. Secondary Standards** Secondary standards are made as nearly as possible exactly similar to primary standards as regards design, material and length. They are compared with primary standards after long intervals and the records of deviation are noted. These standards are kept at number of places for safe custody. They are used for occasional comparison with tertiary standards whenever required. **3. Tertiary Standards** The primary and secondary standards are applicable only as ultimate control. Tertiary standards are the first standard to be used for reference purposes in laboratories and workshops. They are made as true copy of the secondary standards. They are used for comparison at intervals with working standards **(Any three points of difference between primary and tertiary standards-5 Marks)**	5
	C]	Explain concept of flatness. In manufacturing and mechanical engineering, **flatness** is an important geometric condition for workpieces and tools. In the manufacture of precision parts and assemblies, especially where parts will be required to be connected across a surface area in an air-tight or liquid-tight manner, flatness is a critical quality of the manufactured surfaces. Such surfaces are	5

		usually machined or ground to achieve the required degree of flatness. High-definition metrology, such as digital holographic interferometry, of such a surface to confirm and ensure that the required degree of flatness has been achieved is a key step in such manufacturing processes. Flatness may be defined in terms of least squares fit to a plane ("statistical flatness"), worst-case or overall flatness (the distance between the two closest parallel planes within). **(Concept of flatness with suitable example-5Marks)**	
	D]	Explain importance of surface conditions **(Any five points explaining importance of surface conditions- 5 Marks)**	5
Q2	A]	Explain construction and working of any one mechanical comparator **Connstruction-5 Marks** **Working-5 Marks**	10
	B]	Explain following terms with respect to limit, fit and tolerances:- 1) Upper deviation The algebraic difference between the maximum limit of size (of either hole or shaft) and the corresponding basic size 2) Lower deviation he algebraic difference between the minimum limit of size (of either hole or shaft) and the corresponding basic size 3) Fundamental Deviation It is one of the two deviations which is chosen to define the position of the tolerance zone. 4) Tolerance grades is an indication of degree of accuracy of manufacture and is designated by IT followed by a number. IT stands for international tolerance grade. 5) Clearance Fit It is obtained when shaft is always smaller than hole.	10
Q3	A]	Explain Taylor Hobson surface roughness measuring instrument in detail Taylor-Hobson Talysurf is a stylus and skid type of instrument working on carrier modulating principle. Its response is more rapid and accurate as comparred to Temlinson Surface Meter. The measuring head of this instrument consists of a sharply pointed diamond stylus of about 0.002 mm tip radius and skid or shoe which is drawn across the surface by means of a motorised driving unit. In this instrument the stylus is made to trace the profile of the surface irregularities, and the oscillatory movement of the stylus is converted into changes in electric current by the arrangement as shown in Fig. The arm carrying the stylus forms an armature which pivots about the centre piece of E-shaped stamping. On two legs of (outer pole pieces)'the E-shaped stamping there are coils carrying an a.c. current. These two coils with other two resistances form an oscillator. As the armature is pivoted about the central leg, any movement of the stylus causes the air gap to vary and thus the amplitude of the original a.c. current flowing in the coils is modulated.	10

		 **(Construction -4 Marks Principle-3Marks Working-3 Marks)**	
	B]	Explain different quality costs **(Prevention costs Appraisal Costs Internal Failure Cost External Failure Cost Explanation of each cost carries 2.5 Marks)**	10
Q4	A]	Explain Principle, Construction and working of Parkinson's Gear tester. **Principle-3 Marks Construction:-3 Marks. Working :3 Marks**	10
	B]	Explain following:- 1. Pie Charts 2. Bar Charts 3. Scatter Diagrams **(Example of Pie Chart with diagram-3 Marks Example of Bar Chart with diagram-3 Marks Example of Scatter Diagram-4 Marks)**	10
Q5	A]	Explain three wire method used in screw thread measurement. **(Diagram-3 Marks Explanation-7 Marks)**	10
	B]	Explain following:- 1. R –Chart 2. P-Charts 3. np charts 4. X bar charts **(Explanation of each chart carries 2.5 Marks)**	10
Q6	A]	Explain construction and working of Tool Maker's Microscope **(Construction of Tool Maker's Microscope-5 Marks**	10

		Working of Tool Maker's Microscope-5 Marks)	
	B]	Sketch OC curve and explain various elements of it. Also explain double sampling plans **(Sketch of OC curve-3 Marks** **Explanation of elements in OC curve-3 Marks** **Explanation of Double Sampling Plan-4 Marks)**	10